

April 9, 1850.

Prof. Owen, V.P., F.R.S., in the Chair.

The following papers were read:—

1. NOTICES OF AUSTRALIAN FISH. BY SIR JOHN RICHARDSON, M.D., F.R.S. ETC.

(Pisces, Pl. I. II. III.)

In the third volume of the 'Zoological Transactions;' the 'Magazine and Annals of Natural History,' vol. ix.; a report on the "Fish of New Zealand," made to the British Association in 1842; the Ichthyology of the Voyage of the Sulphur, and especially in the Ichthyology of the Antarctic Voyage of the Erebus and Terror, completed in February 1848, I have described various species of Australian fish. Among other sources of information to which I had recourse, a collection of drawings, made by Deputy Assistant Commissary General Neill, in 1841, at King George's Sound, is particularly valuable on account of the notices it contains of the habits and qualities of the fish. The drawings are so characteristic, that most of the species are easily recognised, but some novel forms could not be systematically described without specimens, and the opportunity now afforded me by Mr. Gray of inspecting a number of dried skins prepared on the spot by Mr. Neill, has given occasion to the present paper.

APISTES PANDURATUS, Richardson.

Radii.—B. 7; D. 17|7; A. 3|6; C. 12 $\frac{2}{1}$; P. 14; V. 1|5, spec.

(Pisces, Pl. I. fig. 3, 4.)

Among the various forms that the genus *Apistes* presents, the present one is remarkable for the elevation of the orbit, which rises in a semicircular protuberance, so high above the occiput as to give the hinder part of the head a relative depression like a Turkish saddle, and to render the snout and forehead almost vertical.

The mouth is terminal and small, and both jaws, with the chevron of the vomer and a round patch on each palatine bone, are furnished with minute, short villiform teeth. The intermaxillaries are moderately protractile, and the maxillary, whose dilated lower end drops below the corner of the mouth, has its posterior edge turned outwards producing a ridge. The nasal spines are thick, but acute, and are bent to the curve of the forehead. There is a narrow deep groove between them. This groove widens on the top of the head, where it is bounded by smooth ridges continued from the nasal spines, and in conjunction with them the raised edges of the orbits form an exterior furrow on each side. These four furrows and ridges end in obtuse eminences which cross from the superior-posterior angle of one orbit to the other. Behind them the skull sinks perpendicularly to the level of the nearly flat, depressed occiput, on which however the middle ridges are still visible. The preorbitar is small, very uneven, and emits a

strong spine whose acute point reaches back to the middle of the orbit. The second suborbital in crossing the cheek to the hollow of the preoperculum forms a stout ridge of oblique, somewhat twisted and striated eminences, none of them spinous. The preoperculum has a smooth vertical upper limb, which shows as a narrow, slightly elevated ridge. At its curve or angle there is a strong spine, longer than the preorbital one, but not reaching quite to the gill-opening. A short thick spine is adnate to its base above, and a little way below it there is an acute spine half as long, which is followed by three other angular or spinous points on the lower limb of the bone*. Two prominent but smooth ridges exist on the gill-plate without any spinous points. On the suprascapular region there are two ridges, the upper one having three thick, striated eminences with acute points, and the lower one has two such eminences, with two small points more posteriorly.

There are no scales on any part of the head, and there is a smooth space along the base of the dorsal, which is widest towards the shoulder; the space between the ventrals and the breast anterior to them, with the base of the pectorals and their axils, are scaleless; the rest of the body, including the belly and integuments adjoining the anal, is densely covered with small scales. The lateral line is marked by a series of small eminences and is straight.

Judging from the numbers given in the 'Histoire des Poissons,' and also from the examination of several species not described in that work, the branchiostegous rays seem to vary in the *Apistes* from five to seven. In the species now under consideration there are seven rays, but the lowest one is very slender, and so closely applied to the following one that it can be detected only by dissection.

The dorsal commences between the second points of the suprascapular ridges and extends to near the caudal. Its spinous portion is much arched; the spines are strong and acute, and the seventh one is the tallest, being equal to two-thirds of the greatest height of the body; the other spines are slightly graduated, but the foremost three diminish more abruptly. The last spine is rather more than one-half as long as the soft rays or than the tallest spine. The last soft ray is bound at its base to the back by membrane, but this membrane does not reach to the base of the caudal. The anal terminates rather further from the latter fin, and has three strong spines, the second being the stoutest and as long as the third one; the soft rays surpass them by about a fourth part. The pectorals are large and obliquely semi-oval, the lower rays being the shortest. Their rays are forked, which is a characteristic mark of the genus, and is not common in the Cottoid family. The ventrals are also rather large, exceeding the anal a little in length and in spread. Their spine stands behind the pectoral axil and under the fourth dorsal spine.

The length of the head exceeds the height of the body, and is contained thrice and one-half in the whole length of the fish, caudal included. Length of specimen $5\frac{1}{2}$ inches.

* In the figure, the angle of the mandible being strongly represented, looks like a fourth angular point.

APLOACTIS MILESII, Richardson.

Radii.—Br. 5; D. 14|14; A. 12; C. 13; P. 11; V. 1|2, spec.

(Pisces, Pl. I. fig. 1, 2.)

This fish has the fins of a *Synanceia* with the lateral eyes and head of a *Scorpena*, but instead of the ridges of the cranium, face and gill-covers ending in spinous points, they produce only obtuse knobs. Its teeth in character and position resemble those of *Pteröis*, and its dermal spine-like scales are similar to those of *Centridermichthys* (Zool. of Voy. of Sulphur, p. 73). I am not quite sure that it corresponds in all its general characters with the *Aploactis aspera* of the 'Fauna Japonica' (pl. 22), but it comes sufficiently near to be included in the same generic group.

The form of the fish is rather elongated, the height of the body, which is a little less than the length of the head, being nearly one-fourth of the total length of the fish, caudal included. The compression of the head is moderate, its thickness being only one-third less than its height, and equal to about half its length. The mouth is terminal, cleft only a very short way backwards, but having a moderately large gape. The intermaxillaries are slightly protractile, and their edges and those of the mandible are covered with very short and minute, densely crowded teeth. The chevron of the vomer is similarly armed, but there are no teeth on the very narrow edges of the palate-bones, and the tongue, which is not in the least free at the tip, appears to be quite smooth. The premaxillaries are but slightly protractile, the tips of their pedicles when retracted not reaching half-way to the eye. The maxillaries have a protuberance in the centre of their lower dilated ends, and only their more slender upper halves glide under the preorbital. When the head is viewed in front, two short parallel ridges are seen covering the pedicles of the premaxillaries, above which, on the forehead, there is a deep oblong depression bounded by an elevated bony ridge, from which a side ridge formed by the prefrontals proceeds to each orbit. The margins of the orbits themselves are elevated and uneven, and there is a prominent bend upwards on the edge of each postfrontal bone; the rest of the top of the head is occupied by the front rays of the dorsal fin. The preorbital sends one obtuse ridge forwards over the middle of the maxillary, and another and a larger one backwards in the situation of the spine of an *Apistes*; this one is knobbed at the end and curved upwards. The suborbital chain is elevated and very uneven throughout, particularly the ridge which traverses the cheek to the hollow of the preoperculum. There is a blunt process from the angle of the latter bone, representing the spine common in this family, and three smaller knobs below it, the edge of the bone being also raised in a slighter degree. Two slightly diverging ridges, ending bluntly, cross the operculum; there is a small blunt point on the interoperculum, and four obtuse eminences between the eye and shoulder, representing the two ridges shown in that part in the *Scorpenæ*. The parts between the bony eminences on the head are covered with small spines like those of the body, and the whole, in the recent state, seems to have



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1 2 APLOACTIS MILESII 3 4 APISTES PANDURATUS

W. Mitchell-Jones del. et lith.



been enveloped in soft skin, which in the dried specimen has left traces of a short skinny fringe on the lower jaw and of filamentous points elsewhere. There are several open pores on the limbs of the mandible. The gill-membrane is smooth and is sustained by five curved rays. The gill-openings are closed above the gill-plate, but extend from the point of the operculum downwards and forwards to opposite the articulation of the mandible, being sufficiently ample.

The whole skin of the body and the lower parts of all the fins are studded with straight acute spines, each enveloped in a skinny sheath. The lateral line is nearly straight, having merely a slight rise over the pectoral. It is marked by a smooth furrow and a series of ten or twelve skinny processes.

The dorsal extends from between the eyes the whole length of the back, but is not actually connected to the caudal fin. It is highest anteriorly, lowest over the pectoral, and of medium height and nearly even posteriorly, its end being rounded off. The second spine, which stands over the middle of the orbit, is the tallest, its height being but a little less than that of the head; the first and third rays are only a little shorter, while the fifth and sixth are much lower, producing a deep notch in the fin. The eighth and following spines are very slightly graduated, and from thence to its rounded extremity the outline of the fin is even. The membrane is notched between the rays, and the tips of the jointed rays curve backwards. The first seven or eight spines are pungent, but the six following ones are less so, and are not easily distinguishable in the dried specimen from articulated rays in which the joints have become obsolete. The fore-part of the dorsal shows some small membranous points on the spines. The anal is similar to the soft dorsal, but terminates further from the caudal, and if it be furnished with a spine it is concealed at the base of the first soft ray, there being no appearance of one externally. The caudal when fully spread is almost circular in outline. Its rays are simple, with the tips projecting beyond the membrane, especially those of the extreme pairs above and below. The pectoral has the oblique semi-oval form of that fin in *Synanceia*, but is less adnate to the side. Its rays are simple, with projecting tips. The ventrals, formed of one spine and two unbranched rays, stand exactly under the base of the lowest pectoral rays, and are small.

The only vestiges of colour remaining in the dried specimen are brown and purple bands and blotches on the dorsal, caudal and pectorals, with one or two rows of white spots on the two latter fins.

CHEILODACTYLUS CARPONEMUS, Cuv. et Val. v. p. 362. pl. 128.

Radii.—Br. 6; D. 17|31; A. 3|19; C. 14 $\frac{6}{8}$; P. 8 et VII.; V. 1|5, spec.

This fish is the "Chettong," No. 39, of Neill's drawings, and the "Jew-fish" of the sealers who frequent King George's Sound. Mr. Neill informs us that it is an inhabitant of rocky shores, and that individuals are often taken which weigh more than 16 lbs. It is readily captured by the hook.

The specimen described and figured in the 'Histoire des Poissons'

was obtained by Messrs. Quoy and Gaimard in the same locality with Mr. Neill's, and the latter accords perfectly with it; but I am persuaded that the references in that work referring to Solander and Forster's accounts of a New Zealand species ought to be struck out. Some notices of the discrepancies between the memoranda of these authors and the history of *Ch. carponemus* in the 'Histoire des Poissons' have been given in the 'Zoological Transactions,' vol. ii. p. 101, and since the date of that publication the examination of various Australian specimens has strengthened the reasons I had for coming to that conclusion.

The *Cheilodactyli* do not accord well with the typical *Sciænida*, and the evidences of the ptenoid structure of their scales are often deficient, the teeth on the disks becoming perfectly obsolete, and none existing on the margins of the scales of any species we have examined. In Mr. Neill's specimen the length of the head is contained four and a half times in the total length of the fish, in which the caudal is included. The height of the preorbital equals the diameter of the orbit; and its length is considerably greater, being about equal to one-third of the length of the head. The teeth on the jaws are needle-shaped, small, and arranged in a narrow, not crowded band. The vomer is smooth. The dorsal fin is low, the sixth and tallest spine being only equal to a quarter of the height of the body, and the fifth and seventh spines are scarcely shorter. The spines lower a little towards the soft rays, but there is no decided notch. None of the spines are stout. The second anal spine is as long as the third one and is thicker. The tenth or long pectoral ray reaches beyond the first third of the anal; the caudal is deeply forked. The transverse diameter of the scales generally exceeds the longitudinal one.

Mr. Neill's drawing represents five yellowish lines on each side of the face, reaching backwards to the occiput, the three lower ones crossing the upper part of the preorbital and being interrupted by the eye. The under and fore edge of the preorbital is marked by a blue line, which is prolonged to the temples, and there is also a short blue streak immediately under the orbit, the iris itself being likewise of that colour. Two blue lines traverse the summit of the back close to the dorsal, disappearing under the middle of the soft portion of that fin. The same colour exists on the membrane joining the first three dorsal spines, on the spines of the anal, the ventrals, the long pectoral ray, and the upper and under edges of the caudal, the tint in all these cases being a pure indigo. The rest of the fins are of a paler colour, approaching to mountain-blue.

CHEILODACTYLUS MACROPTERUS, Forster.

Sciænoides abdominalis, Solander MSS. *Pisces Australiae*, p. 11.

Sciæna abdominalis, *Idem*, *op. citat.* p. 29; *fig. pict. Parkins.* 2-40.

Sciæna macroptera, Forster, *Descrip. Anim.* p. 136. *fig.* 206. *Georgio Forst. picta.*

Radii.—Br. 6; D. 17|26; A. 3|14; C. 17; P. 15; V. 1|5, Soland.

Br. 6; D. 17|26; A. 3|14; C. 30; P. 9 et VI.; V. 1|5, Forst.

Of this species I have seen no example, and it is known to me only by the descriptions and figures above referred to. It inhabits the bays of the middle island of New Zealand, and was taken on Cook's first and second voyage in Queen Charlotte's Sound and Dusky Bay. At the latter place its native appellation was ascertained to be "Taraghee," but the seamen called it "Cole-fish." That it is different from the *Ch. carponemus* of the 'Histoire des Poissons' I am inclined to believe, from the dissimilarity of the figure in the latter work with those drawn by Parkinson and George Forster, and from the more notched dorsal and stouter dorsal and anal spines than we find in authentic specimens of *Ch. carponemus* from King George's Sound. These discrepancies, and the smaller number of dorsal and anal rays, authorise us to keep it distinct until an opportunity occurs of examining the New Zealand fish. The broad black band which descends from the shoulder not quite as far as the pectoral is a good distinctive mark. The reader is referred to the 'Zoological Transactions,' vol. iii. p. 101, for extracts from Solander's notes, which may be compared with Forster's description in the 'Historia Animalium,' &c. p. 136.

Some specimens of *Cheilodactyli* from Sydney which I have seen point at a species nearly allied to the two preceding ones as existing in that part of Australia, but the materials I possess are not sufficient for the elaboration of its distinctive characters.

CHEILODACTYLUS NIGRICANS, Richardson.

Radii.—Br. — ; D. 15|26 ; A. 3|10 ; C. 15 $\frac{3}{3}$; P. 9 et V. ; V. 1|5, spec.

Toorjenung, *Neill's drawings*, No. 42.

This fish is the "Toorjenung" of the natives of King George's Sound, and the "Black Jew-fish" of the sealers. Mr. Neill says that it grows to a large size, feeds grossly, and that its flesh is dry and dark-coloured. It is much prized by the aborigines, and forms a principal article of food among the native families, who are expert in spearing fish. The head of a large fish is said to make good soup. It is an inhabitant of rocky points that project from sandy bays, and moves sluggishly along the bottom, ploughing the sand with its soft fleshy lips ; hence it falls a ready sacrifice to the native spear.

In shape this fish approaches to *carponemus*, but is rather more elongated in the body, and has a more arched spinous dorsal. Its eye is more remote from the gill-opening, being nearer to the middle of the head, and the preorbital is shorter, its length not exceeding the diameter of the orbit. The most striking dissimilarity to the preceding species is in the longest pectoral ray, which projects only about one-sixth of its length beyond the membrane. It is the uppermost of the simple rays, and the four others are graduated and also project beyond the membrane as far in proportion. The disk of the preoperculum is broad, that of the interoperculum fully equal to it, and both these bones and the cheek are scaleless in the specimen, which has sustained some damage in the head, but not apparently in these places. *Ch. carponemus* and *aspersus* have interopercular bones rather narrower than the disk of the preorbital, and both these

bones, with the cheek, are covered with small scales which do not extend to the preorbital. In *aspersus* a small part of the cheek next the preorbital is scaleless. In all these species the operculum and suboperculum are densely scaly. The integuments of the cheek of *nigricans* are full of pores, and the lips are large and fleshy. About forty-eight scales occur in a row between the gill-opening and caudal, with three or four rows in addition on the base of that fin. About seventeen compose a vertical row at the shoulder. The scales of the lateral line are, as in the other species, smaller than those above and below, which also overlap them. The exposed disk of a scale is rough, with minute points, but the exterior margin is thin and membranous. The base is faintly marked by a dozen or more slightly divergent furrows, which do not produce marginal crenatures. The sixth and tallest dorsal spine equals one-third of the height of the body and is higher than the soft rays, which rise considerably above the posterior spines. The third anal spine is more slender and considerably longer than the second one. None of them are strong. The caudal is forked to half its depth, and has acute lobes.

In Mr. Neill's drawing this fish is represented as having a dark greyish-black colour on the back, head and fins, and as being pale on the belly. The lips are flesh-coloured. Length of the specimen 21 inches. The drawing is two feet long.

CHEILODACTYLUS ASPERSUS, Richardson.

Cheilodactylus carponemus, Richardson, *Zool. Trans.* vol. iii. p. 99, *exclus. synon.*

Radii.—Br. 6; D. 17|27; A. 3|11; C. 13 $\frac{6}{8}$; P. 8 et VII.; A. 1|5, specimens.

This fish frequents Port Arthur in Van Diemen's Land, and Dr. Lhotzky says that it is never taken at Sydney. In the 'Zoological Transactions' for 1841 (vol. iii. p. 99) there is a notice of it, to which the reader is referred; but it is necessary to state that the number of fin rays there given are those of *Ch. carponemus*, as expressed in the 'Histoire des Poissons.' I there pointed out some of the discrepancies between the examples of this fish I had then before me and the description and figure of *carponemus* in the work just referred to; but being at that time very imperfectly aware of the number and variety of the *Cheilodactyli* existing in the Australian seas, I did not venture to indicate it as a proper species. This I am now enabled to do, after a careful comparison of the specimens then commented upon with Mr. Neill's example of *carponemus* from King George's Sound, the exact locality of the specimen of the latter described by Cuvier and Valenciennes.

Ch. aspersus is a higher fish than *carponemus*, the greatest height of the body being contained only three times and one-third in the total length, caudal included. It is much compressed, with an acute back and a deeply-forked caudal. The more arched form of the spinous part of the dorsal fin, and the much stouter dorsal and anal spines, afford a ready means of distinguishing the dried specimens. The different colours and markings of the recent fish are very appa-

rent. The first and last dorsal spines are much shorter than the corresponding ones of *carponemus*, and the notch of the fin is conspicuous from the greater height of the soft rays. The second anal spine is very stout, and it rather exceeds the third one in length. The preorbital is smaller than in that species, and its length does not exceed the diameter of the orbit. The face is therefore shorter, and the profile rises more steeply to the dorsal, owing to the greater height of the fish. The elongated pectoral ray, which is the tenth, reaches no farther back than the beginning of the anal. The scales are rather large and much tiled. About fifty-two exist on the lateral line, besides six or seven rows on the base of the caudal, and there are twenty-two rows in the height of the fish.

Mr. Lempriere, from whom we had the specimens, says that the fish is known at Port Arthur under the name of "the Perch," and has a bright silvery hue with dark spots. The specimens still exhibit many dark brown spots scattered thickly on the back and more sparingly on the sides, most of them being rather smaller than the exposed disk of a scale. The vertical fins, particularly the caudal, are more minutely spotted. The top of the gill-cover is blackish, and there is a dark mark on the humeral bone. As is usual in the genus, the inside of the mouth and lining of the gill-opening are purplish-black. Length $12\frac{1}{4}$ inches. Greatest height $3\frac{2}{3}$ inches.

The *Cheilodactylus carmichaelis* (Hist. des Poiss. v. 360) (*Chatodon monodactylus*, Carmichael, Linn. Trans. vol. xii. p. 500. pl. 24) approaches *aspersus* in shape, in the length of its long pectoral rays, and in the number of fin rays generally, but it is distinguished by six short, broad dark bars on the back. The formula of its rays is as follows:—*Radii*.—Br. 6; D. $17|24$; A. $3|12$; P. 9 et VI.; V. $1|5$, Carmichael.

The *Cheilodactylus fasciatus* (Cuv. et Val. v. 357) of the Cape is distinguished by four or five vertical dark bands and five transverse lines on each lobe of the caudal. Its rays are stated to be:—

Radii.—Br. 5; D. $19|23$; A. $3|11$; C. 17; P. 10 et V.; V. $1|5$. Hist. des Poiss.

CHEILODACTYLUS GIBBOSUS, Solander. (*Chatodon*.)

Chatodon gibbosus, Banks, *Icon. Parkins. ined.* t. 23.

Cheilodactylus gibbosus, Richardson, *Zool. Trans.* vol. iii. p. 102.

Radii.—D. $17|36$; A. $3|8$; C. $14\frac{1}{4}$; P. 8 et VI.; V. $1|5$, spec.

(Pisces, Pl. II. fig. 3, 4.)

This fish inhabits the seas of Van Diemen's Land and the east coast of New Holland, as well as King George's Sound. A full description of it is contained in the 'Zoological Transactions' quoted above. It has the highest spinous dorsal of any described species of *Cheilodactylus*, and in the distribution of its black bands it bears a considerable resemblance to *Eques americanus*.

Mr. Neill gives a drawing of it (No. 24), and states that it is known to the aborigines of King George's Sound by the name of No. CCV.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

“Knelvek.” The natives spear it on sandy banks, but say that it is rare. Its scales are smooth, and the second and third anal spines are moderately long and equal to each other. The suboperculum is narrow, and together with the other opercular bones and cheek is scaly.

The figure is one-third of the size of the specimen. The scale is magnified. A considerable part of its disk retains the small asperities or ptenoid teeth, which do not however extend to the margin of the scale, that being, as is usual in the genus, thin and membranous.

CHEILODACTYLUS NIGRIPES, Richardson.

Radii.—Br. 6; D. 18|26; A. 3|10; C. 13 $\frac{6}{8}$; P. 7 et V.; V. 1|5, spec.

The aborigines of King George's Sound had no name for this species, and no drawing of it was made by Mr. Neill. The only specimen of it obtained was speared by a native named Murrienne, and measures 13 inches in length. It has a conical eminence on the pre-frontal bone, like that existing in *Ch. gibbosus*; its face is short, with the profile ascending almost as much as in the species just named. The length of the preorbital is rather less than the diameter of the orbit, the eye is placed midway between the gill-opening and mouth, and the interoperculum is only about half as wide as the disk of the preoperculum. The cheek and all the pieces of the gill-cover are densely scaly. The second of the simple pectoral rays is the longest and it falls short of the anus, while only about one-third of its length projects beyond the membrane. The spinous part of the dorsal is arched anteriorly. Its fifth and longest spine rather exceeds one-third of the height of the body. The preceding ones are graduated to the first, whose height is only a fifth part of the fifth one, but the decrease of the posterior spines is much less rapid, the last one having half the length of the fifth. The soft rays rise to nearly twice the height of the posterior spines, rendering the fin notched. The third anal spine is somewhat longer than the second one, which is stouter, but the spines generally are of moderate thickness, and are compressed. The caudal is forked to half its depth. The ventral spine is long and slender. The scales are without asperities, and the exposed part of their disk exhibits the concentric rings of structure distinctly. About sixty-one exist in a row between the gill-opening and caudal, exclusive of three or four on that fin. The teeth on the jaws are slender and closely set.

In the dried specimen the ventrals are pitch-black, and the other fins are nearly equally dark. The body is also dark, but in the absence of drawings or descriptions of the recent fish we cannot state its proper tints.

CHEILODACTYLUS ZONATUS, Cuv. et Val.

Cheilodactylus zonatus, Cuv. et Val. vol. v. p. 365; *Rich. Rep. Brit. Assoc.* 1845, p. 239.

Radii.—D. 17|31; A. 3|8; C. 14 $\frac{5}{8}$; P. 8 et VI. spec.

This fish, which is common to the China and Australian seas, appears to be called the “Zebra-fish” by the sealers who frequent

King George's Sound, though that name is most generally appropriated by them to the *Crenidens zebra*. Its prefrontal bone projects behind the nostril, but not so acutely as in *Ch. nigripes* or *gibbosus*. There is however a difference in this respect in different individuals. The width of the interoperculum is about half that of the preopercular disk, and these bones and the cheek are densely scaly. The scales of the cheek however are imbedded in spongy porous skin. The length of the preorbital equals the diameter of the orbit. In the relative sizes of the opercular bones and preorbital, and in the form of the dorsal, *zonatus* and *nigripes* closely resemble each other, but there is a difference in the anal spines, in the rays of the pectoral, in the shape of the caudals, that of *zonatus* being only sparingly excavated, and a striking one in the colours.

The dried specimen of *zonatus* shows very distinctly eight dark oblique bars on the body, the first crossing the nape and the last the base of the caudal, the intermediate pale spaces being equal to the bars in breadth. The entire head, including the preorbital, is thickly marked by round dark spots of the size of duck shot. There are large spots on the caudal, which are so crowded on the margin of the fin as almost to form a continuous bar. Two or in some parts more rows traverse the dorsal, and there are dark marks on the tips of the anal and ventrals. The simple rays of the pectoral are orange. Mr. Reeves's drawing of the Chinese fish represents it as dressed in very lively colours during the breeding season.

The dorsal is highest at the fifth spine, as in *zonatus*, and is in other respects similar in form; but the anal spines are shorter, especially the second, which is also stouter in proportion. Rather less than one-third of the longest pectoral ray projects beyond the membrane, and the membrane is less deeply notched between the other simple rays than in *nigripes*. The scales differ from those of the last-named species, being finely granulated on the disk, as in *nigricans*.

The rays are somewhat differently enumerated in the 'Histoire des Poissons,' from a Japanese specimen. *Radii*.—Br. 6; D. 17|29; A. 3|8; P. 9 et V.; V. 1|5, Cuv. et Valenc.

The *Cheilodactylus brachydactylus* (Hist. des Poiss. p. 361) of the Cape approaches more nearly to our examples of *zonatus* in the numbers of the rays, but it does not appear to possess the prefrontal prominence, and has no other markings than a triangular black mark behind the eye. *Radii*.—Br. 5; D. 17|31; A. 3|9; C. 17; P. 8 et V.; V. 1|5, Cuv. et Valenc.

Cheilodactylus ciliaris, Richardson, Zool. of the Voy. of the Erebus and Terror, p. 37. pl. 26. fig. 6, 7 (*Latris*; *Sciæna ciliaris*, Forster, &c.), is a species which is allied to the following ones, in the shortness of its simple pectoral rays.

CHEILODACTYLUS HECATEIUS, Richardson.

Latris hecateia, Richardson, Zool. Trans. p. 106. tab. 6. f. 1.

Radii.—Br. 6; D. 18|36; A. 3|27; C. 16 $\frac{2}{3}$; P. 9 et IX.; V. 1|5, spec.

In the account of this species quoted above, I expressed doubts of the rank of *Latris* as a subdivision of the *Cheilodactyli*; but now that I have had an opportunity of examining a more complete gradation of specific forms, I am not disposed to think that it merits to be considered even a subgenus, though the non-prolongation of one of the pectoral rays (usually the tenth) makes it a convenient division of the *Cheilodactyli*, now known to be numerous.

This species inhabits the seas of Van Diemen's Land.

CHEILODACTYLUS LINEATUS, Forster (*Sciæna*).

Cichla lineata, *Schneider*.

Sciæna lineata, *T. R. Forsteri Descr. Anim.* p. 134. An. 1844;
Fig. pict. Georg. Forsteri in Bibl. Banks. servata.

Radii.—Br. 6; D. 18|36; A. 1|26; C. 30; P. 17; V. 1|5, Forst. *l.c.*

This species agrees nearly with the preceding in the numbers of its fin rays, except that Forster says expressly that it has only one anal spine. It has also four dark dorsal stripes, with three intervening silvery ones; but it differs from *hecateius* in the yellowish colour of its fins, and particularly of its caudal, which obtained for it the appellation of "Yellow-tail" from the sailors. It frequents, like the other *Cheilodactyli*, rocky places, was captured by Cook's sailors with the hook, and was much approved as an article of food. It is a native of the seas washing the southern island of New Zealand. Length of specimen described by Forster, 24 inches.

Having seen no specimens we cannot institute a correct comparison with *hecateius*.

THREPTERIUS, Richardson.

(*Θρεπτήριος, ad alendum idoneus.*)

Genus piscium acanthopterygiorum *Cheilodactylis* affine. Corpus catheto-plateum, ovato-oblongum, squamosum. Caput aliquantulum parvum, cute porosâ tectum, absque spinis, angulis vel aciebus serratis ossis. Os ut in *Cheilodactylis* extensibile. Dentes in premaxillaribus, mandibulâ trigonioque vomeris unâ serie instructi, brevissimi, parvi, subconici. Ossa palatis lævia. Genæ craniumque esquamosæ. Os preorbitale angustum. Operculum subtriangulare squamis tectum. Membrana branchiostega radiis sex curvis, satis validis sustentata. Squamæ læves nec dentatæ; linea lateralis recta. Radii pinnarum pectoralium inferiores simplices. Pinna dorsi e nuchâ ferè usque ad caudæ pinnam regnans, squamulis apud radios instructa, membranâ inter spinas profundè emarginatâ; lobulo tamen membranacco e summis spinis pendente. Pinnae ventrales thoracicæ sed a gulâ paulo remotæ.

The characters are deduced from dried specimens, and the pharyngeal teeth and structure of the intestinal canal are unknown. The jaw teeth are not strictly disposed in a single row, since a few minute ones form a row behind the others in front of the premaxillaries; but these can scarcely be visible in the recent fish. The chevron of

the vomer is acute and projects a little. The orifice of the mouth is rather larger than in the *Cheilodactyli*, but the jaws are extensible in about the same degree. The maxillary bone wants the flat thin plate near its head which exists in the *Cheilodactyli* and glides beneath the preorbitar. The latter bone is narrow, its width not being equal to one-third of the diameter of the orbit. The eye is comparatively large, three diameters and a half of the orbit being equal to the entire length of the head, and two of these diameters measure the distance between the hinder edge of the orbit and the tip of the gill-cover. The position of the eye is high enough to encroach upon the profile. The cheek equals the diameter of the orbit in breadth; the disk of the preoperculum is also wide, and the interoperculum moderately so. The operculum and suboperculum conjointly have a triangular form; the former is notched, and the latter is prolonged by a membranous tip, which forms the apex of the gill-cover. Both these bones are densely scaly; there is also a row of scales on the interoperculum, partially overlaid by the thin edge of the preoperculum, and the temples are also scaly. The rest of the head is without scales, but the mucous skin, full of canals and pores, which envelops the head, prevents us from ascertaining the exact extent of the scales, at least in the dried specimens. The top of the head is destitute of scales to the occiput, but in the *Cheilodactyli*, dense, small scales extend forward on the skull to before the eyes. In the absence of thick fleshy lips, the genus differs from *Cheilodactylus*. The preorbitar is neither wide enough nor long enough to conceal the maxillary, which however enters partially beneath its edge. The thin crescentic border of the preoperculum is striated, but not crenated. The same kind of streaks or furrows may be discerned, though not so readily, in some *Cheilodactyli*. The head forms a fourth of the total length. The height of the body is also equal to a fourth of the length of the fish, caudal included. The belly is prominent, and the tail, posterior to the vertical fins, is slender. The lateral line is straight, and each of its scales is marked by a short straight tube, which is placed somewhat obliquely to the general direction of the line. About fifty-two scales compose a row between the gill-opening and caudal, the base of whose rays are also scaly, and the lateral line is prolonged as far as the scales extend on that fin.

The dorsal commences over the upper angle of the gill-opening and reaches to within an inch of the caudal. Its seventh spine, which is the tallest, is nearly equal to half the height of the body; the others are graduated very slightly posteriorly and more rapidly anteriorly. None of them are stout, and all of them are traversed on each side by a deep furrow. The membrane between them is deeply notched, as in the genus *Pelors*, and a slender process running up the back of each spine surmounts it in form of a small free lobe. The soft rays surpass the tallest spine a little, and are more than twice the height of the last one. The anal commences opposite to the beginning of the soft portion of the dorsal and ends beneath its tenth branched ray, or, in the specimens before us, about two inches and a half from the caudal. The spines are like the dorsal ones, grooved and slender,

and the second one, which is scarcely shorter than the third, is not quite twice as long as the first one. The seven inferior simple rays of the pectoral have free tips, their membrane being deeply notched as in the dorsal. The ventrals are attached under the middle of the pectorals, or opposite to the sixth dorsal spine. Their spine is slender, and about two-thirds of the length of the soft rays. The caudal is rounded, with the tips of the rays projecting beyond the membrane.

THREPTERIUS MACULOSUS, Richardson.

(Pisces, Pl. II. fig. 1, 2.)

This fish approaches the division *Latris* of the *Cheilodactyli* in the form of its pectoral fin and other characters, but differs so much in its general aspect, which reminds one of a cottoid fish, that it is well that we can find a structural difference which enables us to place it in a separate genus. This exists in the vomerine teeth, the vomer being smooth in the *Cheilodactyli*, but in this fish it is armed like the jaws by a single row of teeth, which, instead of being setiform and crowded, as in the *Cheilodactyli*, are short, somewhat conical, and confined nearly to a single row on the jaws as well as on the vomer.

The native name of the fish at King George's Sound is "Cūm-beük," and it frequents rocky places, having apparently the same habits with the *Cheilodactyli*. The simple projecting rays of the pectoral would appear to perform the functions of an organ of touch, and are furnished to many fish that, like the *Triglæ*, swim close to the sandy bottom, which they touch with these simple rays, whether they are wholly or partially free. The Cūmbeük is prized as an article of food, whence the generic name.

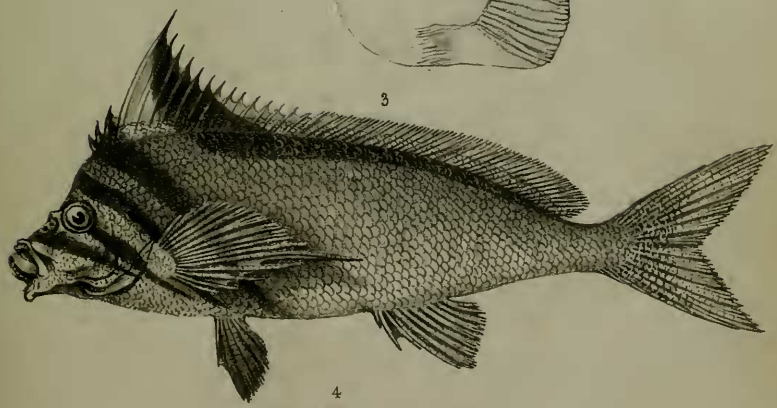
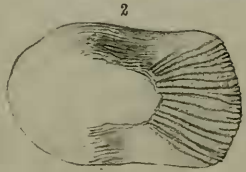
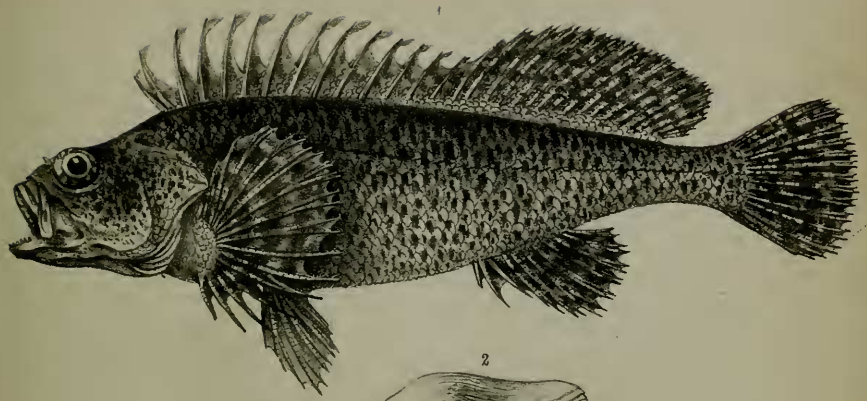
Mr. Neill's figure represents the fish as having a pale brown colour, much lighter on the belly, and thickly studded with irregular dark liver-brown spots, most crowded along the back and becoming much smaller and more scattered on the belly. The fins are rather of a redder brown, and the soft dorsal, ventral and caudal are minutely spotted. Length 9 inches.

TAUTOGA PARILA, Richardson.

Paril and "Common Rock-fish," *Neill's drawings*, No. 9; *Richardson, Ichth. Erebus and Terror*, p. 127, sub *Labro fucicolâ*.

Radii.—Br. 6; D. 9|11; A. 3|10; C. 13 $\frac{1}{4}$; P. 13; V. 1|5, specimens.

This species of *Labrus* or *Tautoga* approaches *Labrus tetricus* (*Ichth. of Erebus and Terror*, pl. 55. f. 1) in general form, but there is only a single row of scales on the temples, and they do not descend lower than the middle of the upper limb of the preoperculum. The scales covering the operculum and suboperculum are, as in the allied species, large. The cheek, preoperculum and the broad thin interoperculum show no scales, but, in common with the top of the head, are covered with a thick skin full of mucous canals and open pores. The diameter of the orbit is less than the length of the preorbital,



1 & THREPTERIUS MACULOSUS
 3. 4. CHEILODACTYLUS GIBBOSUS



and is contained five times and a half in the length of the head when the jaws are retracted. The preorbital lips are only slightly developed, but the intermaxillary and mandibular ones are thick and plaited. Teeth arranged in each jaw in a series gradually decreasing towards the angle of the mouth, the anterior pair above and below being considerably larger and more curved. In the upper jaw there is a complete interior series of small rounded teeth which are on a level with the soft parts. On the mandible the interior row is confined to the fore-part of the jaw, and is less regular. The tubular ramifications on the scales of the lateral line are more numerous and crowded than in *L. tetricus*, or any of the other Australian species figured in the 'Ichthyology of the Erebus and Terror.' There are twenty-four scales on the lateral line having these clusters of tubes, and the clusters do not diminish in size towards the tail, though one or two less bushy occur under the soft dorsal. The line is as usual suddenly bent downwards under the end of that fin.

In the dried skins dark brown lines radiate from the orbit over the temples, cheek, and preorbital, and there are dark spots on the jaws, top of the head and gill-plates. There are also some white blotches and bars on the cheek, preoperculum, interoperculum and lower jaw. The body is variegated with brown spots, crowded along the back, more scattered on the sides, and mixed with small round dots of the same tint. The dark marks extend to all the vertical fins. These spots have an umber-brown colour in Mr. Neill's drawing.

No. 37 of the same drawings represents the "Black-fish of the sealers" and the "Paril" or "Knhoul" of the natives, which is considered to be a variety of the preceding. There is no specimen of it in the collection, but it has the back and upper part of the sides thickly sprinkled with reddish-brown dots without any larger spots. This variety or species is said to grow to the size of 15 or 20 lbs.

COSSYPHUS VULPINUS, Richardson.

Radii.—Br. 4; D. 12|11; A. 3|12; C. 14 $\frac{1}{2}$; P. 16; V. 1|5, spec.

The height of the body is one-fourth of the total length of the fish, caudal included, and is about equal to the length of the head.

The profile rises in a slightly concave line from the acute snout to opposite the back part of the orbit at an angle of 30°. From thence to the beginning of the dorsal, which stands as far back as the axil of the ventrals, the line is almost horizontal, and judging from the dried specimen the dorsal ridge there is acute. When the jaws are protracted the face has a hollow profile, and the strong series of teeth give it a sinister look. There are two pairs of canines at the extremities of the upper and under jaws, the upper ones being inclined forwards, and also a canine at the corner of the mouth, which is bent outwards. The smaller teeth are rather widely set, and there are six of them on each maxillary and fourteen on each limb of the lower jaw; and of the latter the middle ones are somewhat longer than those towards each end of the jaw. Within the front teeth on both jaws there is a flat naked surface of bone fitted for grinding or crushing, and more interiorly a few minute granular teeth scarcely protruding

from the bone. The cleft of the mouth extends backwards to the front of the preorbital bone, and is equal to the distance between the corner of the mouth and the eye.

The preorbital is covered with smooth skin, presenting an even surface in the recent fish, but in the skeleton it presents three deep notches anteriorly, separated by linear processes. The rest of the suborbital chain is narrow. The upper limb of the preoperculum is finely serrated, the serratures disappearing on the rounded angle. The disk of that bone, the other opercular pieces, the cheeks, temples and suprascapulars are scaly, but there are no scales on the limbs of the lower jaw, in which respect the species differs from the *Cossyphus maldat* of the 'Histoire des Poissons,' to which it has some resemblance in general form. There are six rows of scales on the cheek and as many on the interoperculum; the scales on the disk of the preoperculum are smaller than these, and those covering the operculum and suboperculum are considerably larger. The naked part of the scales exhibits little pits rather than granulations. There are thirty scales on the lateral line, each carrying a simple tube with its point turned upwards. The tube is more branched in *C. maldat*. There is no sudden bend in the lateral line, but it descends gradually under the soft dorsal rays to the middle height of the tail, on which there are eight rows of scales.

The anal and dorsal fins move in scaly sheaths, which are broadest on the soft rays. The spinous rays are strong, tapering, and acute. The first dorsal spine stands over the axil of the ventrals; and the ventral spine, which is as tall as the last and longest dorsal one, stands beneath the base of the lowest pectoral ray. The soft parts of the anal and dorsal are somewhat peaked, and rise above the spines. These two fins end exactly opposite to each other, and leave a considerable space of naked tail behind them. The angles of the caudal project a little beyond the straight intermediate border. The colours of the specimen have faded. Length 16 inches.

COSSYPHUS GOULDII, Richardson.

Labrus gouldii, *Rich. Ann. & Mag. Nat. Hist.* xi. p. 353.

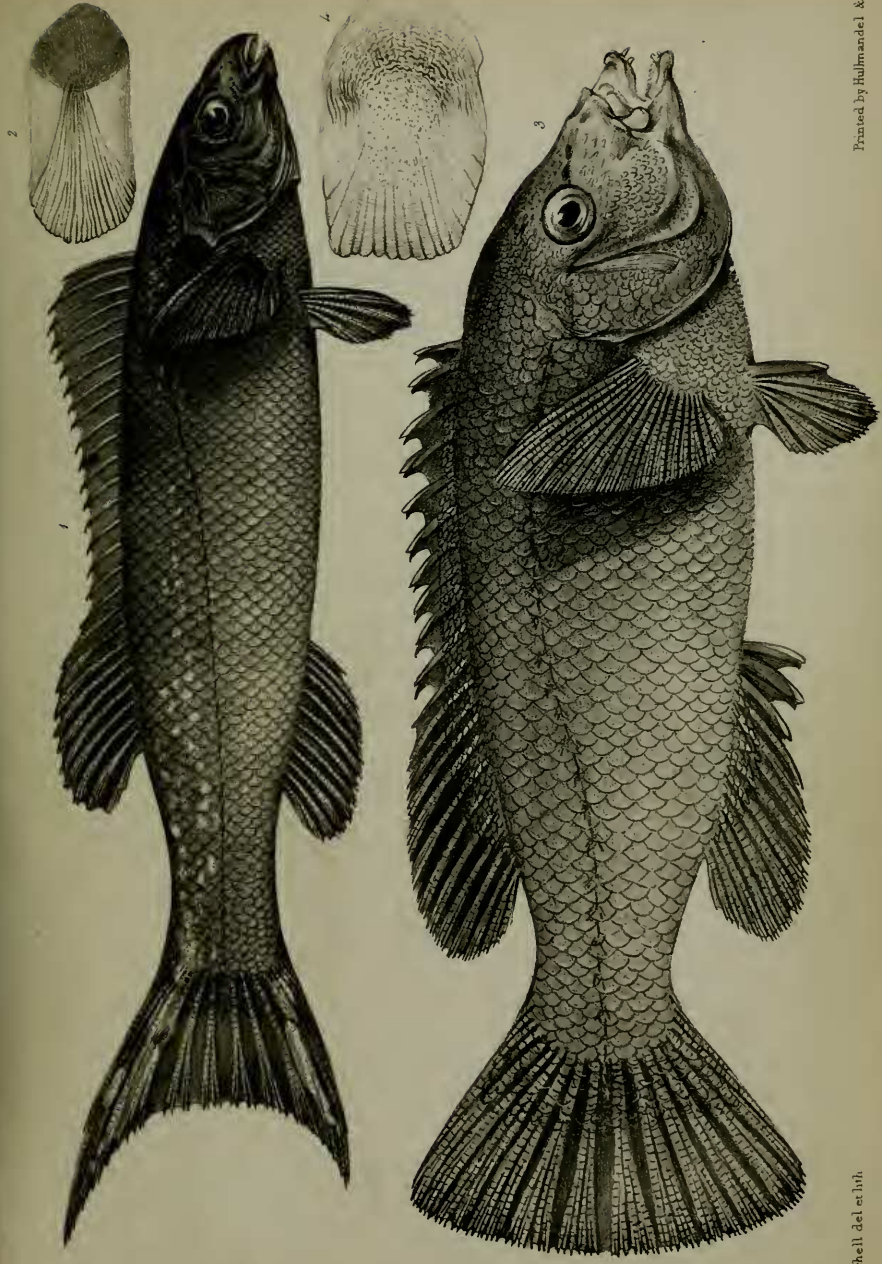
Cossyphus, *vel* *Lachnolaimus gouldii*, *Idem, Ichth. of Voy. of Erebus and Terror*, p. 132.

Radii.—D. 11|10 vel 11; A. 3|10 vel 11; C. 14 $\frac{3}{5}$; P. 17 vel 16; V. 1|5, spec.

(Pisces, Pl. III. fig. 3, 4.)

Mr. Neill's collection contains a young specimen of this fish, which was previously known to me only by an example of considerably greater size, brought from Western Australia by Mr. Gould. Neither specimen retained the pharyngeal bones, and I still remain in doubt as to which of the dismemberments of the Linnæan genus *Labrus* it ought to be referred.

It has the general form of *Labrus*, with the scaly dorsal and anal sheaths of *Cossyphus*, and a peculiarity in the very compressed form of the spinous rays which I have not as yet seen in any other Labroid. It has the four anterior canines in each jaw which exist in



1 2 OLISTHOPS CYANOMELAS. 3 4 COSSYPUS COULDII

